



MicroTCA in CMS

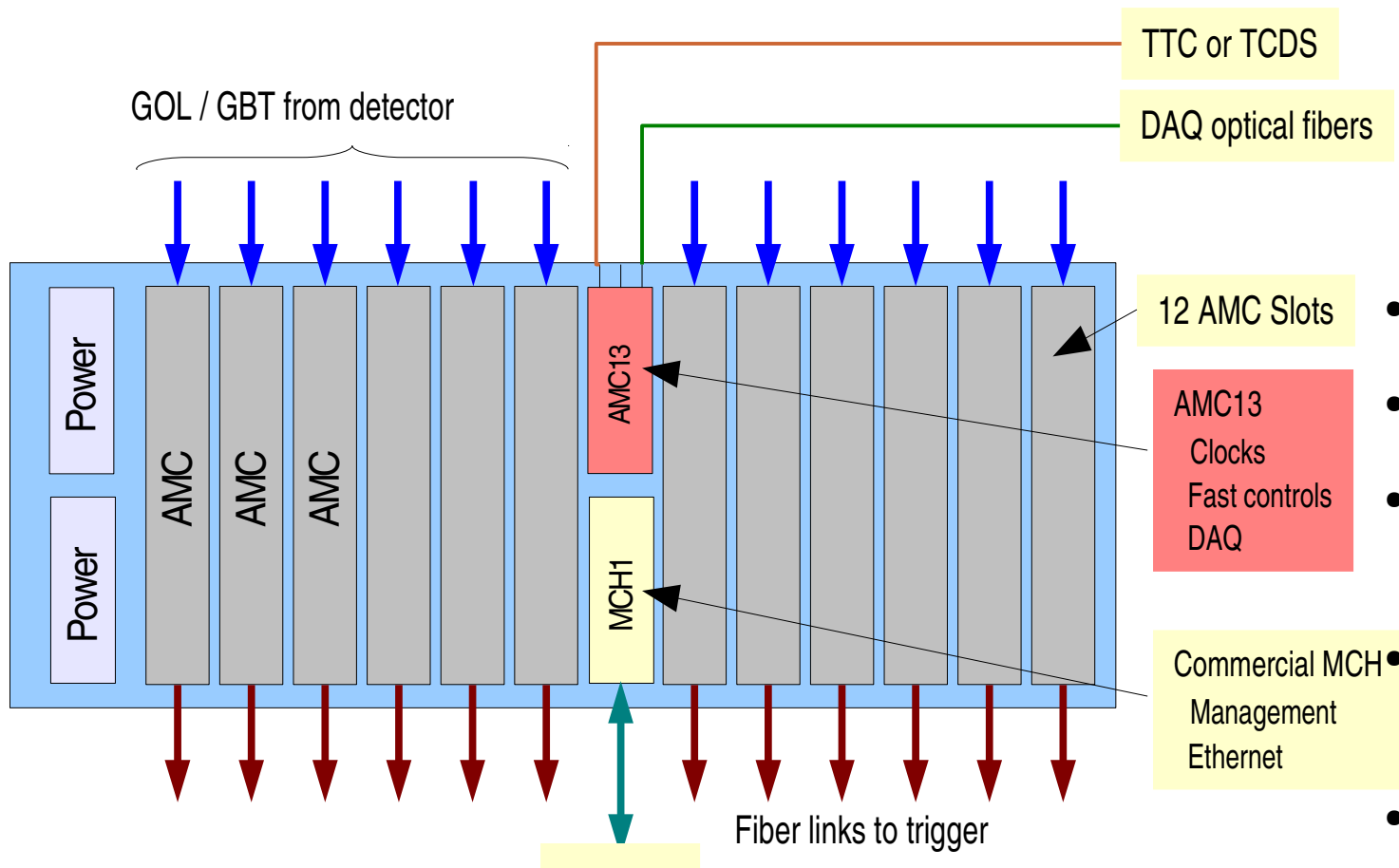
E. Hazen – Boston University



1. Brief summary of CMS MicroTCA system and modules
2. Update on AMC13 design and production

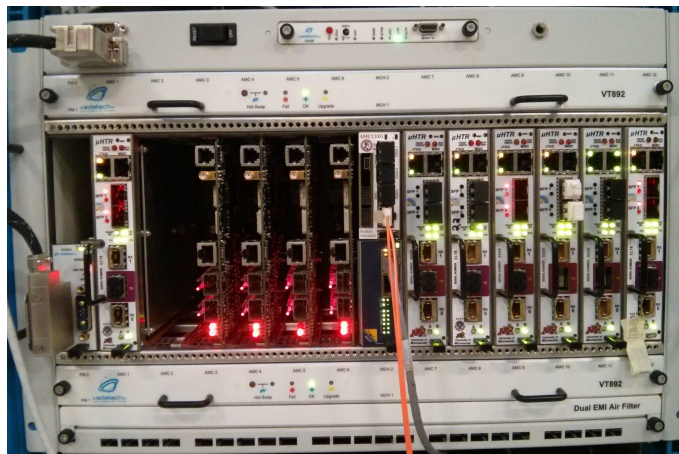


CMS uTCA Crate



Not quite MTCA.4

- 12 slots
- no RTM
- full height (cooling!)
- dual star backplane (AMC13)
- use MTCA standards for clock, controls, DAQ



Commercial Items

uTCA crate
Vadatech*
VT893
VT894



Power-One AC/DC (48V) converter



Power Module
NAT or Vadatech



MCH
NAT or Vadatech



* Development with ELMA ongoing to provide second source

Thanks, Magnus :)

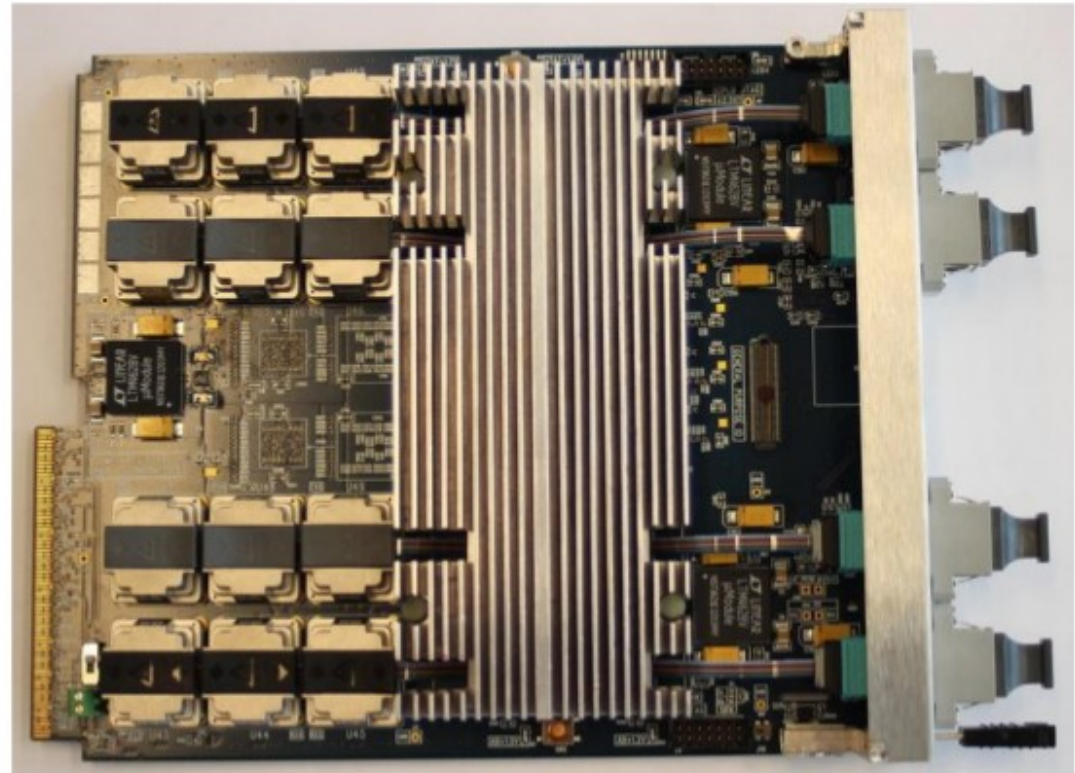
• uHTR

- ♦ FE: XC6VLX240T
- ♦ BE: XC6VLX195T
- ♦ 24 Rx @ 6.4Gb (4.8Gb)
- ♦ 12 Tx @ 6.4Gb (4.8Gb)
- ♦ 2 TRx @ 4.8Gb
- ♦ Ports 4,5,8,9 populated



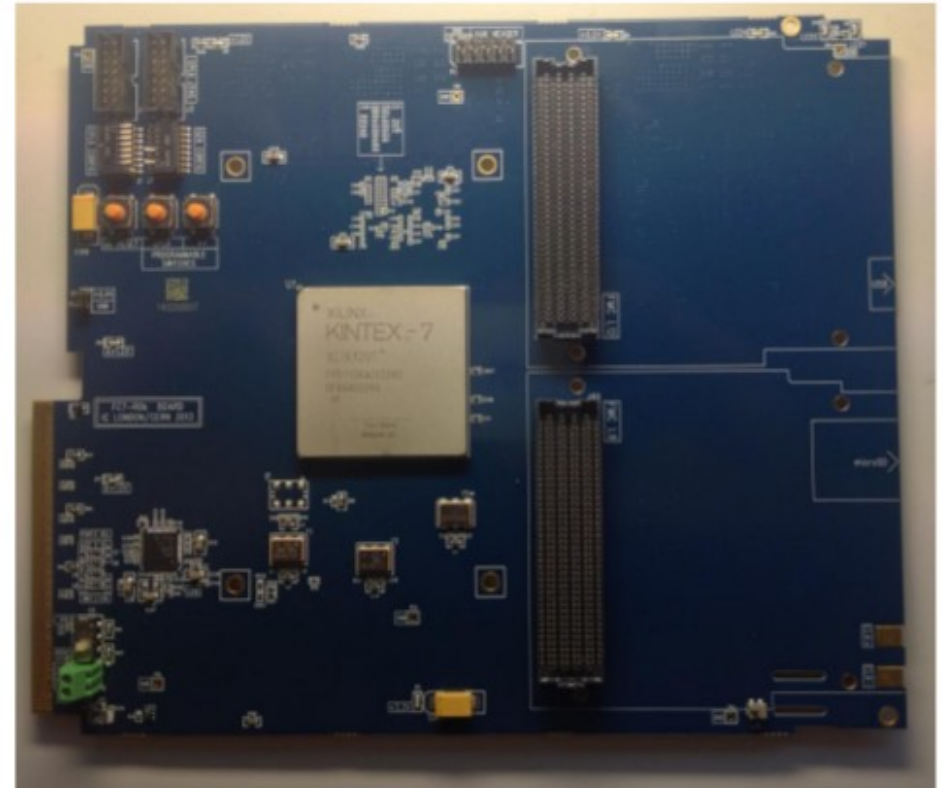
• MP7

- ♦ XC7VX690T
- ♦ 72 Rx @ 13Gb
- ♦ 72 Tx @ 13Gb
- ♦ Ports 4-8 populated
 - 9-11 LVDS



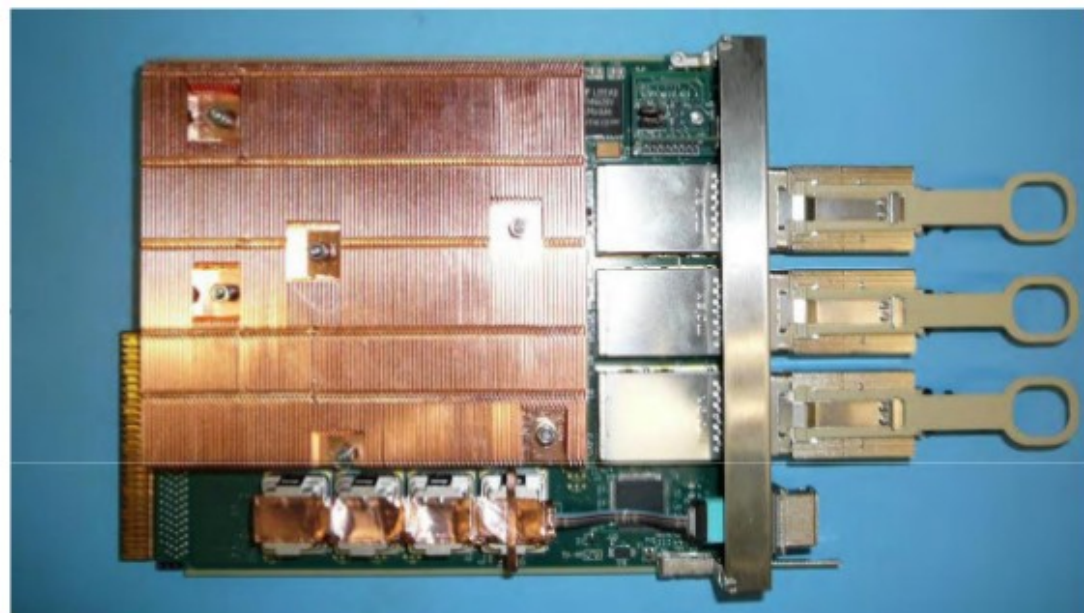
● FC7

- ◆ XC7K420T
- ◆ Two LPC FMC sites
 - Site 1: 8 TRx @ 10Gb
 - Site 2: 12 TRx @ 10Gb
- ◆ Ports 4-11 populated



• CTP7

- ♦ XC7VX690T
- ♦ XC7Z045
- ♦ 67 Rx @ 10Gb
- ♦ 48 Tx @ 10Gb
- ♦ Ports 4-7, 12-15, 17-20 populated (as VT894)



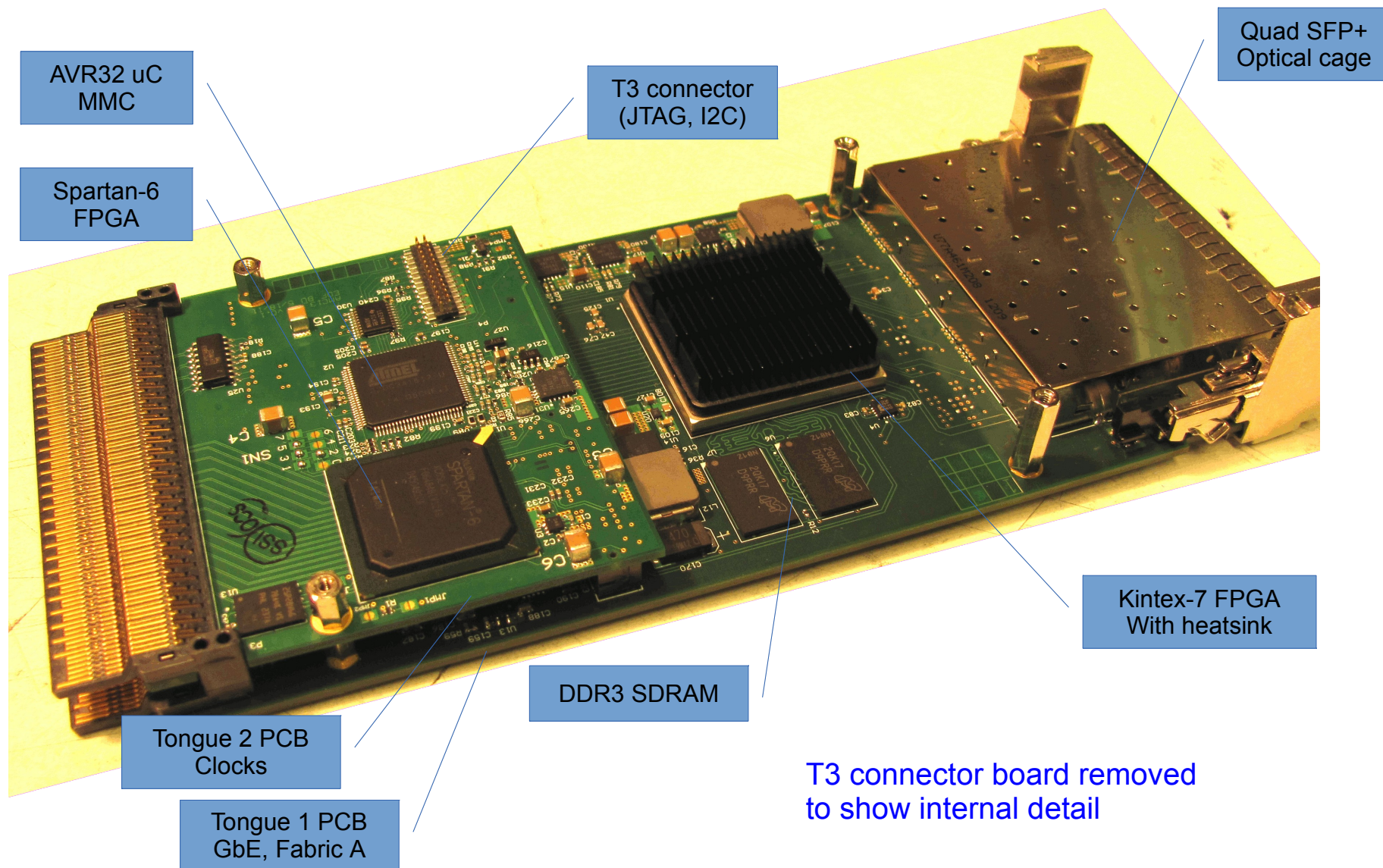
• MTP7

- ♦ **Dual card stack**
 - Occupies two slots
- ♦ **XC7VX690T**
- ♦ **XC7K70T**
- ♦ **80+4 Rx @ 10Gb**
- ♦ **28 Tx @ 10Gb**
- ♦ **Pt LUT module**
 - Up to 2GB low latency RAM
 - Split in banks



AMC13XG (XG = Ten Gigabit)

E. Hazen, D. Gastler, A. Heister, J. Rohlf, D. Zou
Boston University





AMC13XG Update

- Design Changes / Enhancements
 - AMC13XG (10Gb upgrade) prototyped
 - Tested extensively including “full crate” test in CMS HCAL
 - Issue with clock discovered; fixed with small design change to T2 board only (details next)
 - Updated link to CMS CDAQ commissioned and tested
 - Currently operating at 5Gb/s but could go at 10Gb
 - New 10GbE readout option using TCP/IP subset developed
 - Provides a fast readout option for non-CMS users
- Production Status
 - Production run 65 pcs underway



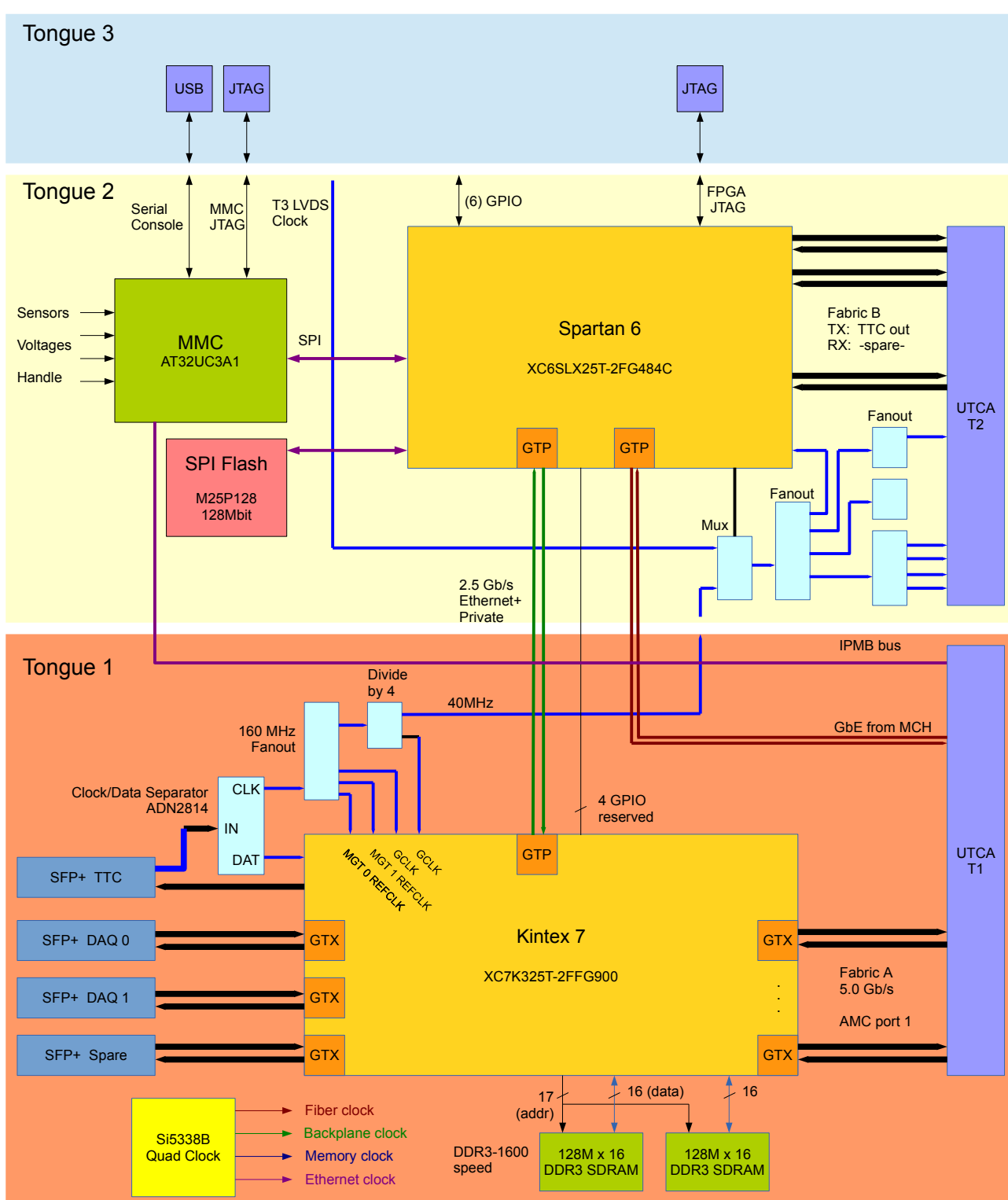
AMC13XG Review

- Single “width” full “height” MCH-like board
 - Mounts in MCH2, requires commercial MCH1
- Distributes LHC clock on MTCA CLK1
- Distributes TTC/TCDS on Fabric B
- Provides 5Gb/s DAQ link on Fabric A
- Front-panel duplex TTC/TDCS fiber
- (3) Front-panel 5/10Gb/s DAQ fibers



AMC13XG Block Diagram

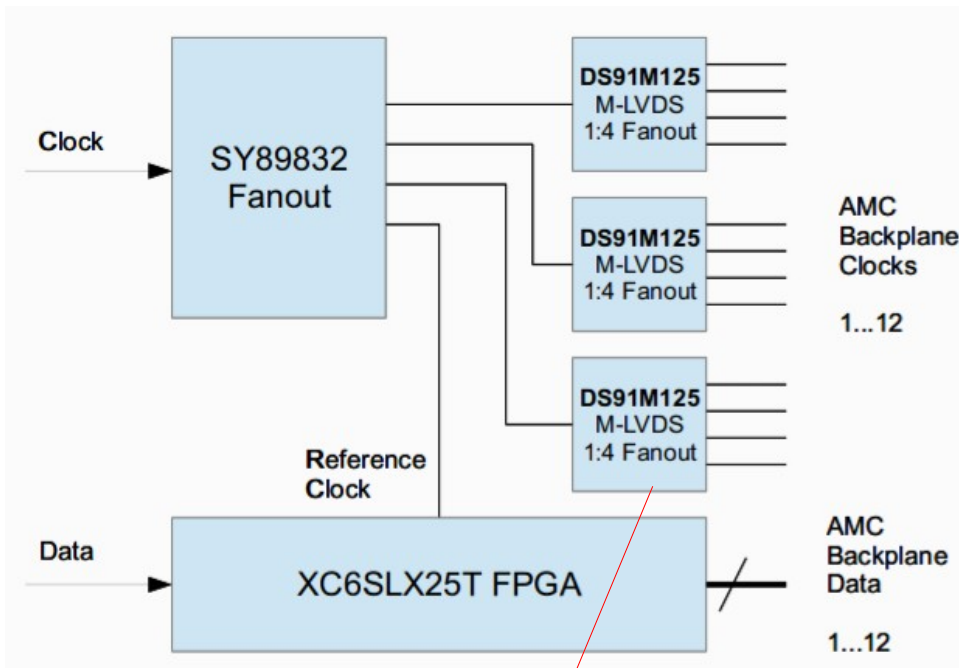
(see poster at ACES this week for more details)



TTC clock update

T2 board design updated to add skew adjust on TTC clocks to backplane (based on results from CMS HCAL “full-crate” test).

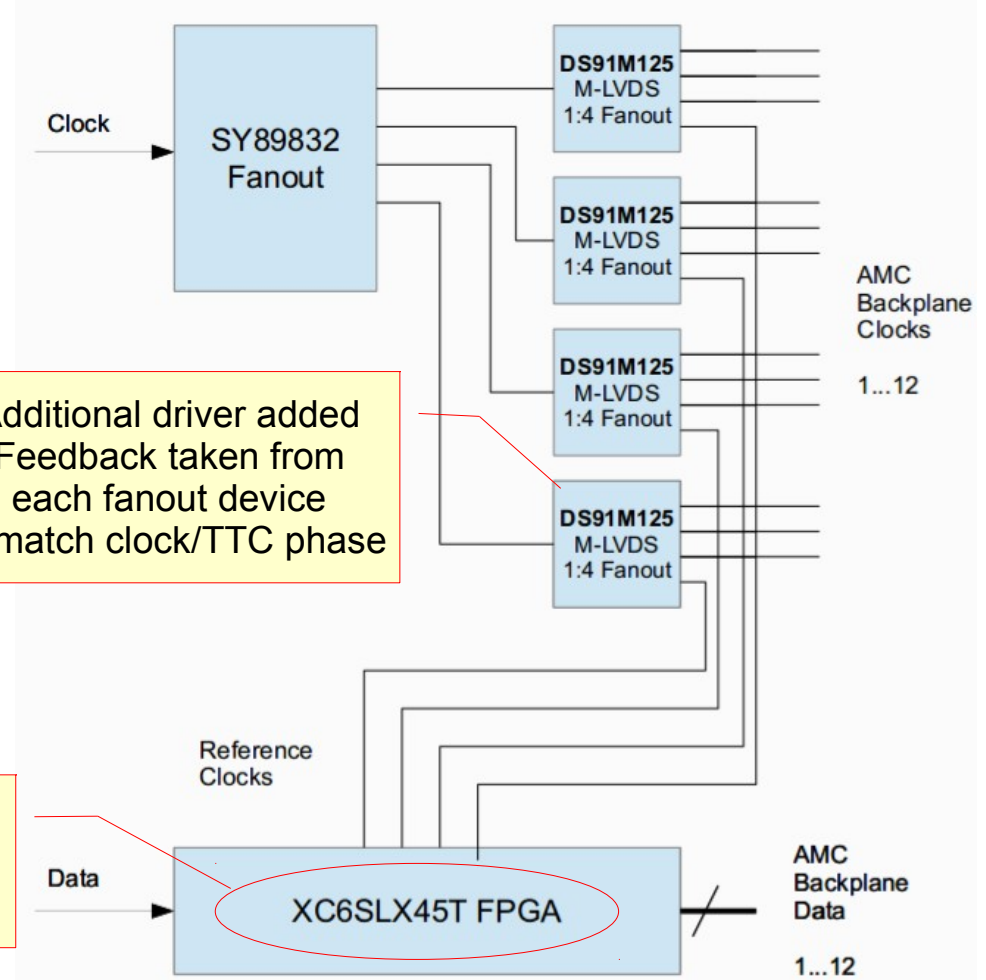
Original T2 design



Delay in M-LVDS drivers not compensated (several ns)

Spartan-6 upgraded to XC6SLX45T for extra clock resources

Updated T2 design



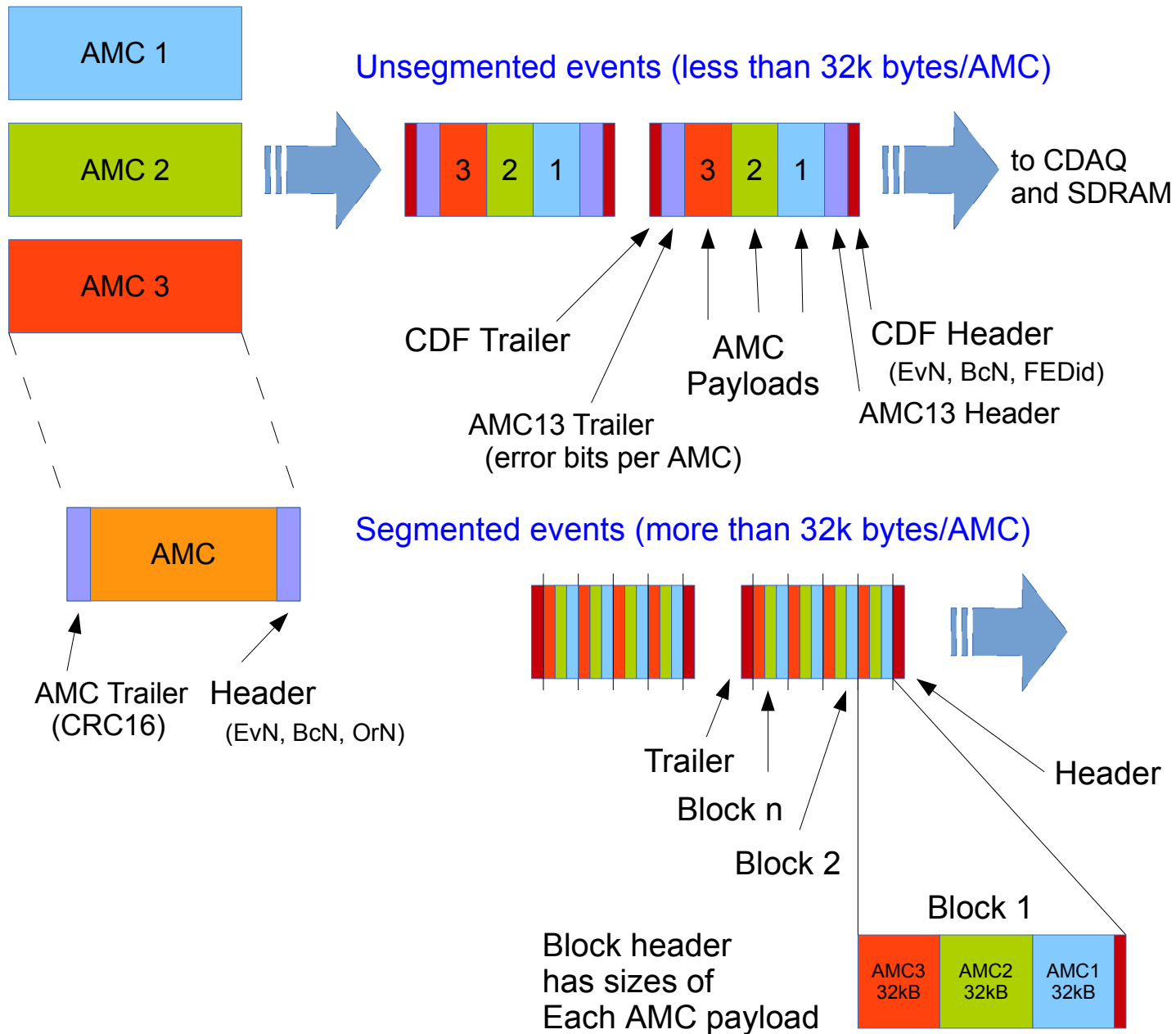


Firmware

- Major update to AMC13 firmware pending
 - Support 3 simultaneous event builders
 - 4, 6 or 12 AMC slots per output link
 - Support arbitrarily large event fragments
- This firmware can in principle support all “normal” users of the AMC13.
 - Special firmware will still be used for e.g. TCDS



Event Builder Update (I)





Production Status

- New T2 design assembled (3 pcs) and tested
Production underway
- Purchasing begun for a large run of AMC13XG (65 pcs, some for G-2).
 - T1 production currently delayed by availability of Harting AMC backplane connector.
 - Expect delivery of full AMC13XG to begin ~ 3 weeks after Harting connectors arrive



Software

- Re-write of AMC13 software beginning
 - Change from flat address table to hierarchy
 - Remove extra class layers so that base class for AMC13 calls uHAL directly
 - Re-write command line tools
 - Assist in development of generic GUI which can support AMC13 using new address table scheme
 - Re-write AMC13 XDAQ support to be more generic (usable by other subdetectors)